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VIRGINIA DEQ PROCEDURES DOCUMENT

FOR

HOT MIX ASPHALT PRODUCING FACILITIES

GUIDANCE DOCUMENT
&
EMISSION FACTORS

Version 1.0

Comment: Please read AP42 Section 11.1, Hot Mix Asphalt Plants prior to reading the procedures.

PERMIT BOILERPLATE FOR HOT MIXED ASPHALT PLANTS

1. PURPOSE

The purpose of this document is to specify requirements for permit approval for hot mix asphalt plants. This boilerplate does not apply to asphalt plants subject to Prevention of Significant Deterioration or Nonattainment permit review. Additional details concerning applicability are given in Section VI.A. Greenfield sites always require a permit to construct and operate per 9 VAC 5-80-11 New Sources with no exemption. A permit is required for non-NSPS equipment where the uncontrolled 8760 hr/yr emissions exceed the 9 VAC 5-80-11 Modified Source Exemption Level by emission rate. NSPS affected equipment requires a permit per 9 VAC 5-80-11. For stationary internal combustion engines, storage silos, fuel storage tanks, etc., use appropriate boilerplates and procedures. The boilerplate is meant to provide a guideline for the minimum requirements of the Department of Environmental Quality. More stringent requirements may be imposed if necessary to demonstrate compliance with NAAQS or other special requirements.

2. REFERENCES

Commonwealth of Virginia Regulations for the Control and Abatement of Air Pollution; Part V, Rules 5-1 (9 VAC 5-50-60 et seq.) through 5-5 (9 VAC 5-50-400 et seq.); Part VIII, 9 VAC 5-80-10; 40 CFR 60.90 through 60.93 (NSPS, Subpart I), 40 CFR 60.670 through 60.676 (NSPS, Subpart OOO); 40 CFR 60.110b through 60.117b (NSPS Subpart Kb); American Society for Testing and Materials (ASTM) Standards D396, "Standard Specification for Fuel Oils" and D1835, "Standard Specification for Liquefied Petroleum Gases".

3. DEFINITIONS

The following definitions are for use in this guideline and do not necessarily have the same meaning in other portions of the regulations.

batch mix plant - an asphalt plant that heats the aggregate, screens out the oversize aggregates, and stores the hot aggregate prior to blending the hot liquid asphalt and the aggregates in a mixer. A batch plant may include hot mix asphalt storage bins and mineral filler (lime) storage silos.

burner - a device that combusts fuel by external combustion to heat either the liquid asphalt or the aggregate dryer.

cold feed bins - a divided aggregate feed hopper fed by a front-end loader or similar device. The aggregates are metered out via volumetric feeders onto a belt conveyor, and moved to the aggregate dryer. Cold feed bins are not subject to NSPS Subpart I, but may be subject to NSPS Subpart OOO if the facility includes an affected reclaimed asphalt pavement (RAP) crusher that uses the same material handling systems.

drum mix plant - an asphalt plant that heats the aggregate and mixes the hot liquid asphalt in the dryer in a continuous process. The drum mix plant may include mineral filler silos and hot mix storage silos.

distillate oil - fuel oil (including diesel oil) that complies with the specifications for fuel numbers 1 or 2 as defined by the American Society for Testing and Materials. This definition does not include number 4 oil nor does it include used or waste oil. Although diesel oil has its own ASTM specification, numbers 1 and 2 diesel oil also meet the specifications for numbers 1 and 2 fuel oil and should be considered as such.

construction - fabrication or manufacture of a new emissions unit.

lime silo - an enclosed storage bin used to store finely ground lime or mineral fillers used in certain asphaltic concrete mixes. The storage silo is usually equipped with a bin vent filter to control particulate emissions during filling. The discharge particulate emissions are usually controlled by complete enclosure.

liquefied petroleum gas - petroleum gas, including butane and propane, as defined by the American Society for Testing and Materials in ASTM D1835.

modification - see the definition of "modification" in Subpart A (40 CFR 60.14) and under 9 VAC 5-80-10 B.3. of State Regulations.

natural gas - a naturally occurring mixture of hydrocarbon and nonhydrocarbon gases found in geologic formations beneath the earth's surface that has been made commercially available through a pipeline distribution system. This definition does not include synthetic gases or byproducts of chemical or refinery processes.

reconstruction - the replacement of an emissions unit or its components to such an extent that the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost required to construct a comparable entirely new unit.

reclaimed asphalt pavement (RAP) - asphaltic concrete that has been reclaimed from roads, parking lots, or from other sources that is reprocessed either by itself or with virgin feed.

RAP crusher - a crusher (usually a form of an impact crusher) used to break up lumps in RAP for ease of handling and reprocessing. This crusher may be subject to NSPS Subpart OOO if manufactured after 8/31/83 and meets the criteria of 40 CFR 60.670(a)(1), a device that reduces the size of the embeded nonmetallic mineral within the asphalt. If the RAP crusher is a NSPS Subpart OOO affected facility, then the feed hopper, belt conveyor, and cold feed screen are also considered as affected facilities and subject to the all provisions of this subpart.

relocation - installation of an emissions unit that has been in service at an off-site location.

rotary dryer - a rotating cylindrical device that utilizes an external heat source to dry and heat aggregates, and in drum mixed plants, mixes the liquid asphalt with the hot aggregate. The rotary dryer, including the burner is the major source of air pollutant emissions

for the asphalt plant. The standard aggregate dryer does not separate the flame from the aggregates, and the dryer is not subject to the provisions of NSPS Subpart Dc or Db.

used oil - means spent lubricating and other industrial oils that are recovered for reuse as fuels, road oils and processed oils. The principal type of used oil is used vehicle crankcase oil recovered by automobile service stations and used oil collection depots. Other types of used oil include metal working lubricants, heavy hydrocarbon fuels, animal and vegetable oils and fats, transmission fluids, brake fluids, hydraulic oils, compressor oils, and industrial oils, including those used as transformer and other heat transfer fluids. Used oil does not include oily wastes, cleaning solvents, degreaser oils or similar products, nor are such products allowed to be mixed with used oil. Common contaminants in used oils include metals, halogens, various Volatile Organic Compounds and solvents, and sulfur. Halogens are introduced from the use of organic halides from additives, or through commingling of used oils and cleaning solvents.

4. PERMIT APPLICATION REQUIREMENTS

An asphalt plant specific permit application has been developed to assist the source and Department in the permitting process. The permit application should include: signed document certification; completed Form 7 general information pages, signed local governing body zoning approval form, if applicable; hourly and annual fuel consumption rates; hourly and annual process throughputs; fuel specifications; air pollution control equipment and efficiencies; primary air pollution control equipment airflow in ACFM, exit temperature, exhaust stack height and diameter in feet; map showing exact location (Greenfield sites and relocated plants); detailed site plan showing property lines and equipment location; manufacturer=s general plant diagram. Other information may be required in order to complete the application, and should be requested from the source.

5. EMISSIONS CALCULATIONS

See Appendix A for fuel specifications and Appendix B for emission factors.

1. CRITERIA POLLUTANT EMISSIONS

There are two primary sources of air pollution from an asphalt plant, the particulate emissions from the aggregates and the emissions from the fuel burning equipment. Sources of fugitive particulate emissions include, but are not limited to, ~~fugitive emissions from roads~~, material handling equipment not controlled by fabric filters, screens, storage bins, hoppers, and RAP crushing. Fugitive dust sources include, but are not limited to, haul roads, stockpiles, and truck dumping. The fugitive emissions and fugitive dust are to be controlled by wet suppression, or other means necessary to minimize airborne particulates. The fuel burning pollutant emissions include, but are not limited to, emissions from the rotary dryer burner, the asphalt heater burner, and diesel-electric generator (if applicable). The particulate emissions created by the rotary dryer, hot aggregate elevator, hot aggregate screen, hot aggregate storage bin, lime silo, and asphalt mixer (pugmill) are controlled by fabric filters.

~~The rotary dryer and~~ Particulate emissions from the asphalt plant=s NSPS Subpart I affected facilities, which include the rotary dryer, hot elevator, screen, hot bins, mineral filler storage silo, and mixer (batch mix plants) are normally controlled by a fabric filter with an allowable grain loading of 0.04 gr/dscf. The use of add-on controls for non-particulate pollutant emissions are not typical for asphalt plants. Since the 0.04 gr/dscf is the applicable standard for particulates, the controlled hourly particulate emissions from the plant=s fabric filter should be omitted in the permit. The controlled expected annual particulate emissions from the asphalt plant= affected facilities are calculated using the asphalt plant particulate emission factors (AP42, Section 11.1), using 99.5% control for fabric filters. The hourly and annual fuel burning emissions (non-particulate) are calculated using the appropriate fuel burning emission factors found in AP42, ~~Hot Mix Asphalt Plants, Section 11.1~~ External Combustion Sources, Sections 1.1-1.11. The fuel burning non-particulate criteria and HAPs emission factors from ~~this~~ AP42, Hot Mix Asphalt Plants, Section 11.1 are not used since ~~the SOx, NOx, CO, VOC, and HAP~~ these emissions are not specific for the actual fuels. ~~Instead, the emission factors from AP42, External Combustion (boiler) are used for all other criteria and HAPs pollutants.~~ The fuel storage tank working and breathing emissions are negligible for most fuels used by asphalt plants and emission calculations are not required.

2. HAZARDOUS AIR POLLUTANT EMISSIONS (HAPS)

Here again, use the emission factors from ~~the~~ AP42, External Combustion Sources, Sections 1.1-1.11. For used oil, calculate the maximum halogen emissions and PCBs using the maximum allowable weight percentage of total halogens and PCB in the fuel.

3. MODELING

Modeling is not generally required for criteria pollutant emissions. For units firing distillate oil or residual oil, the maximum impact is usually the 3-hour SOx and hourly formaldehyde. For used oil-fired units the hourly HCl and formaldehyde impacts are critical. Modeling is to be done by approved agency guidelines. The HAPs emissions should be evaluated according to the exemption levels per Rule 5-3.

6. PERMIT REQUIREMENTS

1. Permitting Applicability

This boilerplate applies to construction, reconstruction, installation, modification, or relocation of an asphalt plant.

1. NSPS Subpart I Applicability

NSPS Subpart I applies to any asphalt plant for which construction, reconstruction, or modification commenced after June 11, 1973. NSPS Subpart I only regulates particulate emissions from the asphalt plant. Subpart I affected facilities include the rotary dryer, screens, hot elevator, hot aggregate storage bins, pugmill (mixer), ~~hot mix storage bin~~, and mineral filler silo system (lime silo).

There is no de minimis level based on hourly asphaltic concrete capacity or fuel consumption.

2. NSPS Subpart OOO Applicability

NSPS Subpart OOO applies to all processing equipment not designated as affected facilities by NSPS Subpart I. In most cases the NSPS Subpart OOO affected facilities may include the cold aggregate handling equipment and RAP crushing system, only if the RAP crusher is determined to be an affected facility for Subpart OOO. The RAP crusher must be capable of breaking the non-metallic minerals embedded in the asphaltic concrete. Once the RAP crusher is determined to be an NSPS OOO affected facility, then all cold aggregate handling equipment must be evaluated for compliance with NSPS Subpart OOO. Note that the hourly capacity of the affected facilities should be clearly stated in Permit Condition #2. See stone processing procedures for details.

3. NSPS Subpart Dc Applicability

NSPS Subpart Dc applies only to boilers fired by gas and/or fuel oil for which construction, reconstruction, installation, modification, or relocation commenced after June 9, 1989 and that has a heat input capability from 10 x 10^6 Btu/hr through 100 x 10^6 Btu/hr. The rotary dryer is not subject to the provisions of NSPS Subpart Dc since there is not a separation of the flame and aggregate. The asphalt heater may be subject to Subpart Dc if the capacity exceeds 10 x 10^6 Btu/hr. See NG-DO boiler procedures for details.

4. NSPS Subpart Kb Applicability

NSPS Subpart Kb may apply to the fuel storage tank capable of storing 40 cubic meters (10,000 gallons) of any liquid with a true vapor pressure less than 15.0 kPa (2.16 psi) that was constructed after July 23, 1984. This does not apply to LPG storage tanks (pressure vessels). Compliance with this Subpart generally consists of reporting to the EPA Region III and keeping records of the tank dimensions and contents. See Storage Tank procedures and NSPS Subpart Kb for details.

2. Permit Conditions

1. Permit Condition #2

Permit Condition #2 should list all affected facilities, permitted emission units, and non-permitted emission units at the asphalt plant. This permit condition should clearly identify which emission units are being constructed, modified, relocated, or reconstructed. Each emission unit subject to a specific NSPS subpart should be identified in this condition. The rated hourly capacity of the emission units, capacity of the storage silos (tons, etc), and source=s reference numbers should be clearly stated.

2. Throughput and Consumption Limits

Permit limits for asphaltic concrete production; approved fuels and annual consumption for the rotary dryer, asphalt heater, and diesel generator (either annual hours of operation of the diesel generator or gallons of fuel per year); sulfur content of the fuel (where applicable). **Do not limit both annual hours of operation and annual production for any emissions unit, limit either annual hours or production**. There is no need to limit annual throughput for the individual emission units that comprise the asphalt plant, these units cannot operate independently of the plant. However, the RAP crusher=s and diesel generator=s operating schedule can be substantially different from the asphalt plant=s operating schedule, and the permit should address this operational difference.

1. Distillate oil, residual oil, and used oil-fired equipment should burn oil with a sulfur content not to exceed 0.5 percent by weight. BACT for SOx is 0.5% sulfur (wt%) for fuel burning equipment.

2. Previous permits had limited the maximum annual throughput of RAP for asphalt plants and allowed for a high opacity limit while running RAP. Since the opacity limit has been increased to not to exhibit 20% or greater, there is no need to limit RAP throughput.

3. Pollutant Emission Limits

1. Asphalt Plant Particulate Emission Limit

The asphalt plant=s primary baghouse has a 0.04 gr/dscf particulate grain loading limit for an exhaust stack. The hourly particulate emissions limit (lb/hr) for the asphalt plant should be omitted and only the grain loading (0.04 gr/dscf) limit should be included as an emissions limit. However, the annual particulate emissions limit is reported in tons/yr.

2. Asphalt Plant Non-particulate Emission Limits

The fuel burning criteria pollutant emissions in excess of 0.5 tons/yr, and HAPs that exceed the Rule 5-3 exemption levels should be specified in the condition limiting the asphalt plant emissions. The asphalt heater, diesel generator, RAP crusher, and other fugitive pollutant emissions (stockpiles, etc) should be limited in separate permit conditions using current permit procedures.

3. Multiple Fuel Emissions Limits

For units capable of burning multiple fuels, the lbs/hr limits are based on the higher emission rate of the fuels combusted. Separate emission rates are not necessary for each fuel. Annual emissions limits in

tons/yr are based on the permitted combination of fuel that produces the highest emission rate. Emission limits in lbs/10^6 Btu are not necessary for non-NSPS fuel burning units.

4. Air Pollution Controls - State BACT

The permit should specify the required minimum air pollution control methods and/or equipment required to meet BACT. Fugitive emissions/dust emissions from cold aggregate handling equipment, stockpiles, RAP crushing, and haul roads require reasonable precautions, which may include, but not limited to, the following: water or suitable chemicals for control of dust during building demolition, land clearing, road grading, and/or construction operations; the use of asphaltic sealants, water, or suitable chemicals to control dust from dirt roads, stockpiles, or other surfaces that may create airborne dust; paving of roadway and maintaining them in a clean condition; the installation and use of hoods, fans and fabric filters to enclose and vent while processing dusty material; cold aggregate processing equipment shall be covered, or treated in an equally effective manner at all times when in motion; and prompt removal of spilled or tracked dirt or other material from paved streets. ~~wet suppression, to control fugitive particulate emissions~~. The hot aggregate material handling, rotary dryer, hot screen, and pugmill require fabric filter or equivalent technology to meet the allowable grain loading standard of 0.04 grains/dscf. The use of a cyclone precleaner prior to the fabric filter is not a State requirement, the cyclone extends the life of the fabric filter bags. The lime silo requires a bin vent filter or equivalent to meet the 5% opacity standard.

5. Opacity

Visible emissions from the asphalt plant affected facilities= exhaust stacks (except lime silo) and hot mix asphalt loadout, transfer systems, and storage silo shall not exhibit ~~exceed~~ twenty (20) percent opacity or greater except during start-up, shutdown, or malfunction (40 CFR 60.92 (a)(2). This opacity limit applies to the rotary dryer, hot aggregate elevator, hot screen and hot aggregate bins, pugmill, and hot mix asphalt loadout, transfer system, and storage bin. **This is state BACT and it meets the NSPS Subpart I standard.** Fabric filters are not effective in the control of the aerosols that can cause the baghouse=s opacity to exceed the typical 5% opacity limit for fabric filters. The requirement to limit the throughput of RAP has been deleted, and the dual opacity standard for the baghouse exhaust has been omitted. There are no provisions for exceedances from the 20% opacity standard for asphalt plants, except for start-up, shutdown, or malfunction. Visible emissions from the lime (mineral filler) storage silo shall not exceed five (5) percent opacity, except during malfunction. Visible emissions from the diesel engine=s exhaust stacks shall not exceed ten (10) percent opacity except during start-up, shutdown, or malfunction. Visible emissions from fugitive emission sources (belt conveyors, and feed hoppers~~, and stockpiles~~) shall not

exceed ten (10) percent opacity except during malfunction. The RAP crusher has a fifteen (15) percent opacity limit per NSPS Subpart OOO. This is state BACT and either meets or is more stringent than the NSPS Subpart OOO standard.

6. Toxic Pollutants

Calculate the hazardous air pollutants (HAPs) for distillate, natural gas, used oil, and residual oil-fired units using the most current emission factors from AP-42, External Combustion and Internal Combustion Sources. HAPS emissions above the Rule 5-3 exemption level should be modeled to insure compliance with the SAAC. Toxic pollutants with emissions greater than the Rule 5-3 exemption level should be included in the permit.

7. Fuel Sulfur Content

All liquid petroleum gas, used oil, and distillate oil-fired units are required to burn fuel having a maximum sulfur content of that given in Appendix A. All uncontrolled residual oil-fired burners must burn oil not to exceed 0.5 percent sulfur by weight.

8. Fuel Sampling

1. No fuel sampling is necessary for gaseous fuels.

2. No fuel sampling is necessary for distillate oil. However, the permittee must obtain a "fuel supplier certification" that includes the name of the oil supplier and a statement that the oil complies with the specifications for fuel oil numbers 1 or 2, as defined by the ASTM.

3. No fuel sampling is necessary for residual oil. However, the permittee must obtain a "fuel supplier certification" that includes the name of the oil supplier, the quantity of fuel delivered, and the sulfur content of the oil.

4. Fuel sampling maybe necessary for used oil. Facilities which purchase used oil that is certified to be used distillate oil satisfies the sulfur content certification requirement due to the definition of distillate oil. If the used oil is not certified to be used distillate oil, the supplier=s certification is acceptable. For each shipment, the certification shall include the following:

(1) the name of the fuel supplier

(2) the date on which the oil was received

(3) the volume of used oil delivered in the shipment

(4) the sulfur content of the oil including an indication of the method used to determine the sulfur content in the oil

(5) the total halogens, PCBs, and heavy metal contaminates (wt %) of the used oil.

9. Emissions Monitoring

Emissions Monitoring - with the exception of measuring the pressure drop across the large fabric filters, emissions monitoring is not required for asphalt plants. A wet scrubber requires the use of a flow meter for measurement of the water flow rate.

10. Emissions Testing

1. A Method 5 (particulate stack test) and Method 9 (Visual Emissions Examination) are required for all new NSPS Subpart I affected facilities. A non-NSPS asphalt plant being constructed in Virginia or a plant where the emissions control equipment have been modified may require both a Method 5 and Method 9 performance test. The test is usually to be performed by an independent testing consultant within 60 days after achieving maximum operation but no later than 180 days after initial start-up. Testing must be done while the unit is operating at least 80% of full rated capacity. One copy of the test results is to be submitted to the DEQ Regional Office within 45 days after test completion. One copy of the initial performance test results is to be sent to EPA Region III within 45 days after the test completion.

2. Initial performance tests (VEE) for RAP crushers, belt conveyor transfers, cold storage bins, and cold screening affected facilities are required per NSPS Subpart OOO. One copy of the test results is to be submitted to the DEQ Regional Office within 45 days after test completion. One copy of the initial performance test results is to be sent to EPA Region III within 45 days after the test completion.

3. Emissions testing for pollutants other than total particulates are not usually required.

11. Training, Operation, and Maintenance

Asphalt plants are required to keep written operating instructions and written records of training of the operators in the operation of the asphalt plant and air pollution control equipment. The source must maintain onsite records of scheduled and non-scheduled maintenance to air pollution control equipment. The source shall maintain an inventory of spare parts for air pollution control

equipment based on the manufacturer's recommendations, at minimum.

12. Notification, State and EPA Region III

The owner or operator must submit notification of the following:

1. the date of commencement of construction, modification, or reconstruction.
2. the anticipated date of start-up,
3. the actual date of start-up, and
4. the anticipated date of the initial performance test, if required by the Department.

Each notification shall be submitted to the Regional Office with a copy mailed to the NSPS Coordinator, EPA Region III, if applicable.

13. Recordkeeping

All permitted facilities must maintain the following records on site, calculated monthly as the sum of each consecutive twelve month period:

1. annual throughput of asphaltic concrete;

2. annual consumption of each fuel used for the rotary dryer, asphalt heater;

3. annual diesel generator operating hours or fuel consumption (as determined by source);

4. a copy of all fuel supplier certifications or fuel analysis of each oil shipment from each fuel supplier, and

5. signed statement from owner or operator that the fuel supplier certifications are representative all of the fuel burned.

6. Additional records required by the Department:

   (1) all scheduled and non-scheduled maintenance to air pollution control equipment.

   (2) training of asphalt plant operators in the proper operation of the process and air pollution control equipment.

14. Relocation of portable plants

Some asphalt plants are permitted as portable units, and relocation of a portable emissions unit requires notification to the Department. Some of the portable plant

operators want a permanent base of operation (home base) with the provisions to move the plant either within the state or outside the state for road work, without being in violation of the permit. Portable plant permit conditions and relocation form letters are to be found in the portable plant boilerplate.

15. Permit Approval

Approval authority is given to the Regional Office. The Regional Director or the Regional Permit Manager may sign for the Director.

APPENDIX A

The following values are to be used to determine the fuel burning emissions and can be used to determine the maximum capacity in millions of Btus/hr when the hourly consumption of fuel is known.

FUEL QUALITY SPECIFICATIONS

natural gas:	1,000 Btu/ft^3
liquid petroleum gas (butane):	97,000 Btu/gal
liquid petroleum gas (propane):	90,000 Btu/gal
#1 distillate oil (including: #1 diesel oil)	134,000 Btu/gal
#2 distillate oil (including: #2 diesel oil)	138,000 Btu/gal
Used oil (RCRA fuel):	140,000 Btu/gal
#4 oil (blended #6 & #2):	144,000 Btu/gal
#5 oil (blended #6 & #2):	146,000 Btu/gal
#6 oil (residual):	150,000 Btu/gal

Density

natural gas:	0.042 lb/ft^3
liquid petroleum gas (butane):	4.84 lb/gal
liquid petroleum gas (propane):	4.24 lb/gal
#1 distillate oil (including: #1 diesel oil) #2 distillate oil (including #2 diesel oil):	6.79 lb/gal 7.05 lb/gal
Used oil (RCRA fuel):	see suppliers data
#4 oil (blend #2 & #6):	7.97 lb/gal
#6 oil:	8.76 lb/gal

C. Fuel Sulfur Content

Unless specified and documented by specific analyses, the fuel shall be assumed to have the following sulfur content, by weight;

liquid petroleum gas (butane):	0.014 %* (considered nil)
liquid petroleum gas (propane):	0.0185 %* (considered nil)
#1 and #2 distillate oil: (including #1 and #2 diesel oil)	0.5 %*
#4 oil(range 0.5% - 1.5%):	See suppliers specification
#6 oil:(range 0.5% - 2.5%):	See suppliers specification
used oil:	0.5%

* Maximum based on ASTM standards

APPENDIX B

UNCONTROLLED FUEL BURNING EMISSION FACTORS TABLE

(lb/hp-hr)	1 & 2 fuel oil SCC 10200501 (Lbs/1000 gal) #1-134000 Btus/gal #2-138000 Btus/gal	4 fuel oil SCC 10200504 (Lbs/1000 gal) 144000 Btus/gal	5 fuel oil SCC 10200404 (Lbs/1000 gal) 146000 Btus/gal	6 fuel oil, SCC 10200401 (Lbs/1000 gal) 150000 Btus/gal	gas SCC 10200602 lbs/$10^6 ft^3$ 1000 Btus/cu.ft.	LPG SCC 10201002 (Lbs/1000 gal) 90000 Btus/gal	used SCC 10300501 (Lbs/1000 gal) 140000 Btus/gal	Diesel-Gal/(hr&yr) (Note 1) SCC 20200401 (Lbs/1000 gal) 137030 Btus/gal	Diesel-hours (Note 1) SCC 20200401
TSP	2.0	7.0	10.0	9.19 %S +3.22	7.6	0.6	64%A	13.70	0.0022
PM10	1.0	6.3	8.6	8.03%S +2.65	7.6	0.6	57 %A	13.703	0.0022
SOx	143.6 %S	151.6 %S	158.6 %S	158.6 %S	0.6	0.1*%S	107%S	158.37%S0	0.001*%S
NOx	20lbs	20	55	55l	100	19	16	469.8	0.031
CO	5	5	5	5	84	3.2	2.1	107.6	0.0067
VOC	0.2	0.2	0.28	0.28	5.5	0.5	0.1	12.5	0.0025
arsenic	0.00055	0.00055	0.00132	0.00132	0.00023	ND	0.06	ND	ND
beryllium	0.00041	0.00041	0.000028	0.000028	ND	ND	0.0018	ND	ND
cadmium	0.0015	0.0015	0.0004	0.0004	ND	ND	0.012	ND	ND
chromium	0.0092	0.0092	0.000248	0.000248	0.0011	ND	0.18	ND	ND
formaldehyde	0.061	0.061	0.061	0.061	0.155	ND	0.061	0.163	$8.26x10^{-6}$
manganese	0.0019	0.0019	0.00011	0.000248	0.00038	ND	0.05	ND	ND
nickel	0.0004	0.0004	0.0845	0.0845	0.0036	ND	0.0845	ND	ND
POM	0.0033	0.0033	0.0033	0.0033	0.00024	ND	0.0033	0.00021	2e-06
mercury	0.00041	0.00041	0.00011	0.00011	0.00026	ND	0.00011	ND	ND
total halogens							0.05		

Emission factors from AP42, Sections 1.11-1.11 and 3.3, 10/96, ND means no data, heavy metals from dryer controlled by fabric filter @ 99.5%, all fuel sulfur is emitted as SO_2

(Note 1) HAPS analysis not required for diesel engines smaller than 6,000 Bhp (generator <4,000 kW) and operating less than 5,000 hr/yr

UNCONTROLLED ANNUAL PARTICULATE EMISSIONS FACTORS FOR ASPHALT PLANTS

NOTE: **DO NOT ADD PARTICULATE EMISSIONS FROM DRUM DRYER- FUEL COMBUSTION TO THESE PARTICULATE EMISSION FACTORS**

USE FUEL BURNING PARTICULATE EMISSION FACTORS WITH ASPHALT HEATERS

	Batch mixed SCC 30500201 (Lb/ton)	Drum mixed SCC 30500205 (Lb/ton)	Lime Silo SCC 30501107 (Lb/ton)	RAP crusher SCC 30502001 (Lb/ton)	Conveyor Transfer SCC 30502099 (Lb/ton)	Front-end Loader Stone Quarry Procedures (Lb/ton)
TSP	32	19	0.24	0.00071	0.026	0.06
PM-10	4.5	4.4	0.12	0.00070	0.0014	0.03
TSP Ct. Eff.	99.5% (fabric filter)	99.5% (fabric filter)	99.9% (fabric filter)	95% (wet supp.)	99% (wet supp.)	95% (wet supp.)
PM-10 Ct. Eff.	99.5% (fabric filter)	99.5% (fabric filter)	99.9% (fabric filter)	95% (wet supp.)	97% (wet supp.)	95% (wet supp.)

HOURLY PARTICULATE EMISSION FACTOR FOR ASPHALT PLANTS

(((100%-%H2O)/100)*(ACFM*0.04 gr/DSCF)*(68E F + 460E R)*60 MIN/HR)/(7000 gr/lb*(EXIT TEMP EF + 460 E R))

WHERE:

% H_2O = the moisture content of exhaust stack , assume 20% moisture
ACFM = the actual airflow rate in cubic feet per minute from fabric filter at actual temperature
EXIT TEMPERATURE = measured fabric filter exhaust temperature in E F.
0.04 gr/dscf = allowable grain loading of fabric filter exhaust per NSPS Subpart I and State BACT

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